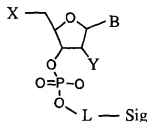


What is claimed is:

1. A method of analyzing a nucleic acid population comprising:

converting the nucleic acid population into nucleic acid fragments;

5 ligating the nucleic acid fragments to a donor molecule to form labeled nucleic acid fragments using a ligase, said donor molecule having the formula



wherein B is a heterocyclic moiety; X is a functional group which permits attachment of the donor to the 3' OH group of an RNA; Y is -H, -OH, -OR, -SR, -NHR, or a halogen

10 wherein R is an alkyl or aryl group; L is a linker and/or spacer group; and Sig is a detectable moiety;

hybridizing the labeled nucleic acid fragments to an array of nucleic acid probes,

and determining hybridization signals of the probes as an indication of levels of the nucleic acids in the nucleic acid population.

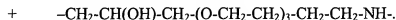
15 2. A method according to claim 1 wherein said nucleic acid population comprises mRNA or molecules derived therefrom.

3. A method according to claim 1 wherein said ligase is an RNA ligase.

4. A method according to claim 3 wherein said ligase is T4 RNA ligase.

5. A method according to claim 1 wherein Y is -OH.

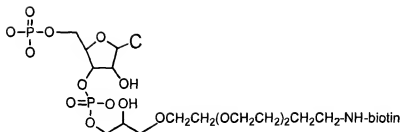
20 6. A method according to claim 1 wherein L is



7. A method according to claim 1 wherein X is PO_4^- .

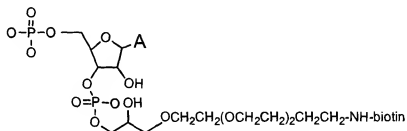
8. A method according to claim 1 wherein B is a ribonucleotide base or a deoxyribonucleotide base.

25 9. A method according to claim 1 wherein said donor molecule comprises the following structure:



wherein C is cytosine.

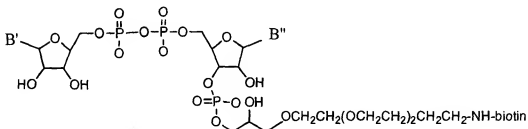
10. A method according to claim 1 wherein said donor molecule comprises the following structure:



wherein A is adenine.

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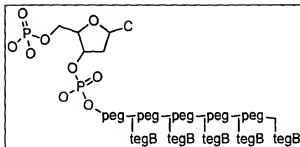
11. A method according to claim 1 wherein said donor molecule comprises the following structure:



- 15 wherein B' and B'' represent a ribonucleotide base.

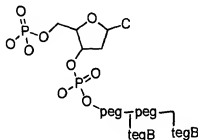
12. A method according to claim 11 wherein B' is adenine.
 13. A method according to claim 1 wherein said donor molecule comprises the following structure:

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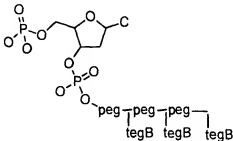
14. A method according to claim 1 wherein said donor molecule comprises the following structure:

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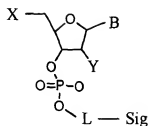
15. A method according to claim 1 wherein said donor molecule comprises the following structure:

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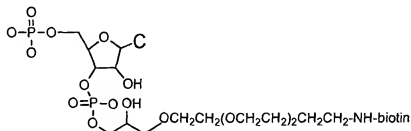
16. A method of analyzing a nucleic acid comprising:

ligating the nucleic acid population to a labeled nucleic acid molecule to form labeled nucleic acids using a ligase, said labeled nucleic acid molecule is



- wherein B is a heterocyclic moiety; X is a functional group which permits attachment of the nucleic acid labeling compound to the 3' OH group of an RNA; Y is -H, -OH, -OR, -SR, -NHR, or a halogen wherein R is an alkyl or aryl group; L is a linker and/or spacer group; and Sig is a detectable moiety;
- hybridizing the labeled nucleic acids to an array of nucleic acid probes, and determining hybridization signals of the probes as an indication of levels of the nucleic acids in the nucleic acid population.
- 10 17. A method according to claim 16 wherein said nucleic acid comprises mRNA or molecules derived therefrom.
 18. A method according to claim 16 wherein said ligase is an RNA ligase.
 19. A method according to claim 18 wherein said ligase is T4 RNA ligase.
 20. A method according to claim 16 wherein Y is -OH.
 - 15 21. A method according to claim 16 wherein L is

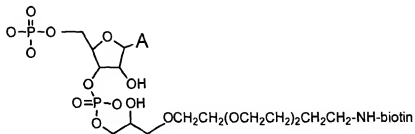
-CH₂-CH(OH)-CH₂-(O-CH₂-CH₂)₃-CH₂-CH₂-NH-
 22. A method according to claim 16 wherein X is PO₄-.
 23. A method according to claim 16 wherein B is a ribonucleotide base or a deoxyribonucleotide base.
 - 20 24. A method according to claim 16 wherein said donor molecule comprises the following structure:



wherein C is cytosine.

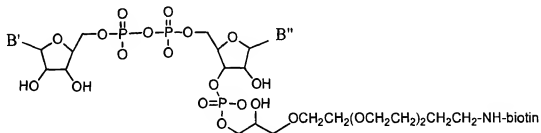
25. A method according to claim 16 wherein said donor molecule comprises the following structure:

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wherein A is the ribonucleotide base adenine.

10 26. A method according to claim 16 wherein said donor molecule comprises the following structure:

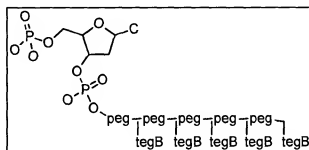


wherein B' and B'' represent a ribonucleotide base.

27. A method according to claim 26 wherein B' is adenine.

15 28. A method according to claim 16 wherein said donor molecule comprises the following structure

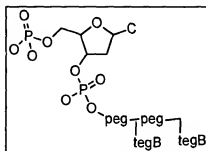
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29. A method according to claim 16 wherein said donor molecule comprises the

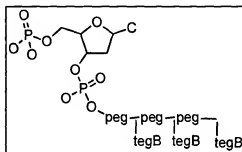
following structure:

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30. A method according to claim 16 wherein said donor molecule comprises the following structure

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